PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2001-041978

(43)Date of publication of application : 16.02.2001

(51)Int.Cl. G01R 1/067
G01R 1/073
H01L 21/66

(21)Application number : 11-216851

(22)Date of filing : 30.07.1999

(71)Applicant : JAPAN ELECTRONIC MATERIALS CORP

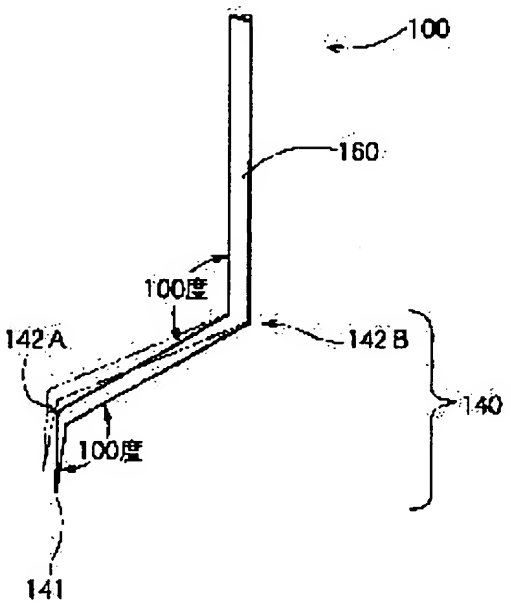
(72)Inventor : OKUBO MASAO
OKUBO KAZUMASA
IWATA HIROSHI

(54) PROBE AND PROBE CARD TO USE THE SAME

(57)Abstract:

PROBLEM TO BE SOLVED: To provide probes highly densely, to perform elastic deformation with a margin during overdriving, and to facilitate one-by-one replacement.

SOLUTION: This probe card is provided with a substrate 300 in which a wiring pattern 310 is formed, a plurality of probes 100 electrically connected to the wiring pattern 310 and arranged in such a way as to be drooped down from the substrate 300, and a probe supporting member 200 provided on the lower surface side of the substrate 300 to support the probes 100. The probes 100 comprises two bent parts 142A and 142B formed in such a way as to be bent inversely with respect to each other at angles of 90° or more at the tip of the probes 100 protruded more downward than the probe supporting member 200.



LEGAL STATUS

[Date of request for examination]	30.07.1999
[Date of sending the examiner's decision of rejection]	14.08.2001
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]	
[Date of final disposal for application]	
[Patent number]	
[Date of registration]	
[Number of appeal against examiner's decision of rejection]	
[Date of requesting appeal against examiner's decision of rejection]	

[Date of extinction of right]

Bibliography

---

(19) [Publication country] Japan Patent Office (JP)
(12) [Kind of official gazette] Open patent official report (A)
(11) [Publication No.] JP,2001-41978,A (P2001-41978A)
(43) [Date of Publication] February 16, Heisei 13 (2001. 2.16)
(54) [Title of the Invention] A probe and the probe card using this
(51) [The 7th edition of International Patent Classification]
G01R 1/067
1/073
H01L 21/66
[FI]
G01R 1/067 G
1/073 E
H01L 21/66 B
[Request for Examination] Tamotsu
[The number of claims] 2
[Mode of Application] OL
[Number of Pages] 7
(21) [Application number] Japanese Patent Application No. 11-216851
(22) [Filing date] July 30, Heisei 11 (1999. 7.30)
(71) [Applicant]
[Identification Number] 000232405
[Name] JEOL ingredient incorporated company
[Address] 2-5-13, Nishi-Nagasu-cho, Amagasaki-shi, Hyogo-ken
(72) [Inventor(s)]
[Name] Okubo Masao
[Address] 2-5-13, Nishi-Nagasu-cho, Amagasaki-shi, Hyogo-ken Inside of JEOL ingredient incor
porated company
(72) [Inventor(s)]
[Name] Okubo Kazumasa
[Address] 2-5-13, Nishi-Nagasu-cho, Amagasaki-shi, Hyogo-ken Inside of JEOL ingredient incor
porated company
(72) [Inventor(s)]
[Name] Iwata **
[Address] 2-5-13, Nishi-Nagasu-cho, Amagasaki-shi, Hyogo-ken Inside of JEOL ingredient incor
porated company
(74) [Attorney]
[Identification Number] 100085936

[Patent Attorney]
[Name] Onishi Koji (besides one person)
[Theme code (reference)]
2G011
4M106
[F term (reference)]
2G011 AA02 AA16 AB01 AB06 AB07 AC05 AC14 AE03
4M106 AA02 BA01 BA14 DD03 DD04 DD06 DD10

[Translation done.]

Epitome

---

(57) [Abstract]
[Objects of the Invention] A probe can be formed in high density, elastic deformation which has allowances at the time of an overdrive is carried out, and the exchange per presupposes that it is easy.
[Elements of the Invention] The substrate 300 with which the circuit pattern 310 was formed, and two or more probes 100 which are electrically connected to said circuit pattern 310, and are arranged by hanging from a substrate 300, It was prepared in the inferior-surface-of-tongue side of said substrate 300, and has the probe supporter material 200 which supports said probe 100, and said probe 100 is the tip which projects below the probe supporter material 200. A bending include angle is made into 90 degrees or more, and it has the two bending sections 142A and 142B which bend mutually conversely and are formed in it.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The probe which is hung and arranged from the substrate which constitutes a probe card, is a probe which contacts the electrode pad formed in the measuring object object at an abbreviation perpendicular, bends at a tip, makes an include angle 90 degrees or more, and is characterized by having at least two bending sections which bend mutually conversely and are formed in it.
[Claim 2] The substrate with which the circuit pattern was formed, and two or more probes which are electrically connected to said circuit pattern and are arranged by hanging from a substrate, It is prepared in the inferior-surface-of-tongue side of said substrate, provide the probe supporter material which supports said probe, and said probe at the tip which projects below probe supporter material The probe card which makes a bending include angle 90 degrees or more, and is characterized by having at least two bending sections which bend mutually conversely and are formed in it.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the probe used in case many electric properties, such as a semiconductor integrated circuit formed in measuring object objects, such as a wafer, are measured, and the probe card using this.
[0002]
[Description of the Prior Art] The conventional probe card is divided roughly into the horizontal-type type which uses the sideways probe called a cantilever mold, and the vertical mold type which uses the probe 100 of the vertical mold called a vertical type as shown in drawing 3 .
[0003] The conventional horizontal-type probe card is equipped with two or more probes with which the whole is abbreviation sideways, and the point was usually bent and formed in the direction of a perpendicular, the substrate with which the circuit pattern to which this probe is connected was formed, and the probe susceptor attached in the inferior surface of tongue of this substrate. The mountain side section of a probe is being fixed to the bottom taper side of probe susceptor with adhesives.
[0004] On the other hand, the conventional vertical-type probe card (it is also hereafter called the 1st conventional vertical-type probe card.) shown in drawing 3 Two or more probes 100 which contact at right angles to the electrode pad 611 of the semiconductor integrated circuit 610 formed in the wafer 600 which is a measuring object object, It was prepared in the inferior-surface-of-tongue side of the substrate 300 with which the circuit pattern to which this probe 100 is connected was formed, and this substrate 300, and has the probe supporter material 200 which supports the vertical section 160 of said probe 100.
[0005] The flection 130 which bent the probe 100 in the shape of ****** to the vertical section 160, and was formed is formed. This flection 130 is formed in order to control contact pressure so that the point 110 of a probe 100 may damage the electrode pad 611 of a semiconductor integrated circuit 610 and may not make it damage at the time of the overdrive mentioned later.
[0006] The probe supporter material 200 consists of epoxy system adhesives layers 270 which are applied to the top face of the bottom support substrate 210 and the bottom support substrate 220 which were supported in parallel with a substrate 300, and the bottom support substrate 210 by the supporter material 250 and this supporter material 250 of the shape of a rod which hung from the inferior surface of tongue of a substrate 300, and fix a probe 100 by them.
[0007] Two or more through tubes 211 and 221 corresponding to arrangement of the electrode pad 611 formed in the wafer 600 are established by the bottom support substrate 210 and the bottom support substrate 220, respectively. While being positioned and supported because a probe 100 penetrates these through tubes 211 and 221, contact of probe 100 adjoining comrades is also prevented beforehand. In addition, the flection 130 of a probe 100 is formed so that it may be located in the clearance between the bottom support substrate 210 and the bottom support substrate 220.
[0008] The end face section of a probe 100 is inserted in the through hole 311 of a substrate 300, and is soldered to the electrode 310 formed in the top face of a substrate 300 through the jumping wire 700.
[0009] There is also another conventional vertical-type probe card which changed a part of structure of the probe 100 of such 1st conventional vertical-type probe card as follows. Another vertical-type probe card of this former is also hereafter called the 2nd conventional vertical-type probe card.
[0010] Instead of the flection 130 of said probe 100, the probe of the 2nd conventional vertical-type probe card prepares the straight-line-like buckling section, and absorbs the force at the time of the overdrive later mentioned by the buckling of this buckling section. Therefore, as for the probe which has this buckling section, the whole is formed in the shape of a straight line. In addition, it is fixed to the bottom support substrate 210 as well as [the probe which has said buckling section] said probe 100 with epoxy system adhesives.

[0011] Thus, it is fixed to the standing ways 800 shown in drawing 3 , respectively by the conclusion member 811 when the constituted conventional horizontal-type probe card (the circumference device of a probe card is referring to drawing 3), the 1st conventional vertical-type probe card, or the 2nd conventional vertical-type probe card is used for the test of a wafer 600. These standing ways 800 are established in the tip side of the test computer which is not illustrated. The movable table 700 on which a wafer 600 is set is formed in the horizontal-type probe card [which was fixed to these standing ways 800], or vertical-type probe card bottom.
[0012] Hereafter, it explains centering on the 1st conventional vertical-type probe card. A test computer is connected to the terminal 320 of the top face of the substrate 300 of the vertical-type probe card fixed to standing ways 800. It is set to the movable table 700 by the automatic taking-out close equipment which a wafer 600 does not illustrate. A wafer 600 is raised on the movable table 700, and the electrode pad 611 of the semiconductor integrated circuit 610 formed in the wafer 600 contacts the point 110 of a probe 100.
[0013] After this contact, in order to secure perfect contact, further, the movable table 700 is raised several 10- 100 and dozens of micrometers, and the electrode pad 611 is pushed against the point 110 of a probe 100. This is called overdrive.
[0014] The electrical signal from a test computer is exchanged with the semiconductor integrated circuit 610 formed in the wafer 600 through a terminal 320, an electrode 310, the jumping wire 700, and a probe 100, and a test is performed. After a test is completed, the movable table 700 is once lowered and carries out horizontal migration by the dimension of the semiconductor integrated circuit 610 which the test ended. Then, again, the movable table 700 is raised and the next test is performed.
[0015] In addition, also in the 2nd conventional vertical-type probe card, it is [of the 1st conventional vertical-type probe card mentioned above] the same.
[0016] On the other hand, in the case of the conventional horizontal-type probe card, fundamentally, although it is the same, the actuation at the time of an overdrive differs from the case of the 1st conventional vertical-type probe card a little as follows.
[0017] Namely, in the case of the conventional horizontal-type probe card, a tip side field is pushed up by the bottom rather than the part currently fixed to probe susceptor among probes at the time of said overdrive. The segment which connects the end face point and tip point of said tip side field is not level, and has become a thing with an inclination. Therefore, using the end face point of said tip side field as the supporting point, if the tip of a probe is pushed up at the time of an overdrive, it is raised so that an arc may be drawn mostly. That is, a part of force of the direction of a perpendicular which starts at the tip of a probe at the time of an overdrive changes to horizontal component of a force, and the tip of a probe sideslips slightly. Since the tip of a probe will be in the condition of sideslipping grinding the front-face side of the electrode pad 611 opposing friction etc., generally this phenomenon is called a scrub (GOSHIGOSHI **** thing). According to this phenomenon, the point of a probe prevents contact resistance increasing by oxidation, foreign matter adhesion, etc., and there is effectiveness refreshed for said point.
[0018]
[Problem(s) to be Solved by the Invention] Although the conventional horizontal-type probe card has the outstanding description which was mentioned above, and the description mentioned later, since it arranges the probe sideways, it is structure unsuitable for forming a probe in high density, and its degree of freedom of arrangement of a probe is also lower than the conventional vertical-type probe card (the 1st or the 2nd). Therefore, the vertical-type probe card has come to be brought into the limelight rather than a horizontal-type probe card as the requests of the coincidence test of many semiconductor integrated circuits in accordance with high integration and detailed-izing of a semiconductor integrated circuit, and multiplexing of a test computer mount in recent years.
[0019] However, when in the case of the 1st conventional vertical-type probe card a damage is given and at least one fault arises among the probes of hundreds prepared during handling - 1000 numbers, it cannot exchange easily. since [that is,], as for a probe, a flection is located in the clearance between a bottom support substrate and a bottom support substrate -- the upper and lower sides -- there is difficulty on repair that it can draw out to neither.
[0020] In addition, there are many vertical-type probe cards in which the coincidence test of many semiconductor integrated circuits is possible, and since it has thousands of probes, and it is expensive, naturally repair is needed. It is a fault that unlike the conventional horizontal-type probe card with which exchange of a probe is in the comparatively easy installation condition at this time it cannot exchange some defects' probe one [at a time] easily when it is the 1st conventional vertical-type probe card.
[0021] Said 2nd conventional vertical-type probe card solved this problem, i.e., the problem which cannot exchange one probe of some defects at a time easily. As mentioned above, the whole of the probe of the 2nd conventional vertical-type probe card is a straight line-like. therefore -- if it removes from the adhesives which some probes which produced fault get mixed up with removing the jumping wire connected to the end face, and are fixing the end face side of a probe -- the

upper and lower sides -- it can draw out to all and a new probe can also be inserted. Therefore, in the case of the 2nd conventional vertical-type probe card, the exchange per of a probe is easy.
[0022] However, in the 2nd conventional vertical-type probe card equipped with the probe which has the buckling section, the buckling according to bending of ** in the bow of the buckling section is performed in the part near an elasticity limit, and it is common for there to be little allowances. Therefore, in order for a probe to sometimes cause plastic deformation and to be equal to the measurement which is about 1 million times, it may apply to dependability.
[0023] Moreover, since the scrub phenomenon in which the tip of a probe sideslips slightly does not occur in the case of the conventional 1st and the 2nd vertical-type probe card, when a test is repeated and a real time becomes long, there is a problem that the contact resistance of a probe increases.
[0024] The main purpose of this invention is prepared in high density, and carries out elastic deformation which has allowances at the time of an overdrive, and offering an easy probe and the probe card using this has the exchange per. It is in offering the probe for which it can be prevented combining and contact resistance's increasing, and the probe card using this.
[0025]
[Means for Solving the Problem] The probe applied to claim 1 of this invention in order to solve the above-mentioned problem is a probe which contacts the electrode pad which hung, has been arranged from the substrate which constitutes a probe card, and was formed in the measuring object object at an abbreviation perpendicular, is bent at a tip, makes an include angle 90 degrees or more, and it has at least two bending sections which bend mutually conversely and are formed in it.
[0026] The substrate with which, as for the probe card concerning claim 2 of this invention, the circuit pattern was formed, Two or more probes which are electrically connected to said circuit pattern and are arranged by hanging from a substrate, It was prepared in the inferior-surface-of-tongue side of said substrate, and has the probe supporter material which supports said probe, and at the tip which projects below probe supporter material, said probe makes a bending include angle 90 degrees or more, and has at least two bending sections which bend mutually conversely and are formed in it.
[0027]
[Embodiment of the Invention] Hereafter, the probe card concerning the gestalt of operation of this invention using the probe of this invention is explained, referring to drawing 1 and drawing 2 . In addition, the probe card concerning the gestalt of operation of this invention is used instead of the conventional vertical-type probe card shown in said drawing 3 , being fixed to the standing ways 800 shown in drawing 3 . The rough cross-section explanatory view showing the probe card which drawing 1 requires for the gestalt of operation of this invention, and drawing 2 are the rough front views showing the tip side of the probe used for the probe card concerning the gestalt of operation of this invention.
[0028] The probe card concerning the gestalt of operation of this invention The substrate 300 with which the circuit pattern (illustration abbreviation) was formed, and two or more probes 100 which are electrically connected to said circuit pattern and are arranged by hanging from a substrate 300, It was prepared in the inferior-surface-of-tongue side of said substrate 300, and has the probe supporter material 200 which supports said probe 100, and said probe 100 is the tip which projects below the probe supporter material 200. A bending include angle is made into 90 degrees or more, and it has the two bending sections 142A and 142B which bend mutually conversely and are formed in it.
[0029] Said probe 100 has the two bending sections 142A and 142B in the straight-line-like vertical section 160 and the contact section 140 which is the tip side of this vertical section 160. The bending sections 142A and 142B make a bending include angle 90 degrees or more, for example, 100 degrees, are bent mutually conversely and formed in it. It becomes a sideways part between bending section 142A and 142B, and it demonstrates the function as a spring at the time of an overdrive. The tip side is an abbreviation perpendicular from bending section 142A so that the electrode pad 611 may be contacted at an abbreviation perpendicular.
[0030] A probe 100 is formed as follows, for example. First, electrolytic polishing of the tungsten wire containing with a diameter of 50 micrometers RENYUUMU 3% is carried out, and what sharpened the tip is formed. About this thing, it cuts in the location where the diameter at a tip becomes 25 micrometers, and from this location, it cuts further in the location of 12mm, and a straight-line-like thing is obtained. It bends 100 degrees in the location of 1mm from the edge (namely, part used as the tip 141 of the contact section 140 of a probe 100) at which the thing of the shape of this straight line is sharp, and it is referred to as bending section 142A, it bends from this bending section 142A 100 degrees to hard flow in the location of 2 moremm, and is referred to as bending section 142B. In addition, in drawing 2 , the tip 141 of a probe 100 is sharpened on illustration so that intelligibly [the migration situation at the tip 141], but in fact, as mentioned above, the diameter is formed in 25 micrometers.
[0031] The probe supporter material 200 consists of adhesives layers 270, such as an epoxy system which is applied to the

top face of the bottom support substrate 210 and the bottom support substrate 220 which were supported in parallel with a substrate 300, and the bottom support substrate 210 by the supporter material 250 and this supporter material 250 of the shape of a rod which hung from the inferior surface of tongue of a substrate 300, and fixes a probe 100 by them.
[0032] Two or more through tubes 211 and 221 corresponding to arrangement of the electrode pad 611 formed in the wafer 600 are established by the bottom support substrate 210 and the bottom support substrate 220, respectively. While being positioned and supported because a probe 100 penetrates these through tubes 211 and 221, contact of probe 100 adjoining comrades is also prevented beforehand.
[0033] In addition, the bottom support substrate 210 and the bottom support substrate 220 are machinable ceramics (for example, trade name MASERAITO of Mitsui Mining Co., Ltd. etc. is suitable.) with a thickness of 0.25mm. The magnitude of a through tube 211 is the size which can insert the vertical section 160 of a probe 100. That is, the magnitude of a through tube 211 is good at larger extent a little than 50 micrometers. Moreover, the magnitude of a through tube 221 is a little larger 60 micrometers than size 50micrometer of the vertical section 160 of a probe 100.
[0034] The through hole 311 which can insert the end face of a probe 100 in the location used as said the shape of through tubes 211 and 221 and a straight line is formed in the substrate 300. The electrode 310 to which the end face of a probe 100 is connected through the jumping wire 700, and the terminal 320 to which the test computer which is not illustrated is connected are formed in the top face of a substrate 300. The through tube (illustration abbreviation) for conclusion members (illustration abbreviation) fixed to the standing ways 800 shown in the substrate 300 at drawing 3 is prepared.
[0035] Thus, in case the probe card concerning the gestalt of operation of constituted this invention is assembled, the vertical section 160 of a probe 100 is inserted in through tubes 221 and 211, and it inserts in a through hole 311 further. The end face of the vertical section 160 of a probe 100 is connected to the jumping wire 700. In addition, for example, the bottom support substrate 210, the bottom support substrate 220, and distance of a between are set to 5mm, and are assembled.
[0036] On the other hand, the other end of the jumping wire 700 is connected to an electrode 310. In addition, although the adhesives layer 270 is formed in the top face of the bottom support substrate 210 by spreading instead, it may be prepared in the inferior surface of tongue of the bottom support substrate 210, and, of course, may be prepared in the top face and inferior surface of tongue of the bottom support substrate 210.
[0037] Thus, the conclusion member which is not illustrated to the standing ways 800 shown in drawing 3 is fixed, and the probe card concerning the gestalt of operation of assembled this invention is used for the test of a wafer 600. When the electrode pad 611 of the semiconductor integrated circuit 610 formed in the wafer 600 set to the movable table 700 is pushed up in the direction of a perpendicular to the tip 141 of the contact section 140 of a probe 100 at the time of an overdrive, a probe 100 comes to be shown in drawing 2 . Namely, by using bending section 142B as the supporting point, the tip 141 of the contact section 140 of a probe 100 is raised so that an arc may be drawn mostly. That is, a part of force of the direction of a perpendicular which starts at the tip 141 of the contact section 140 of a probe 100 at the time of an overdrive changes to horizontal component of a force, and the tip 141 of a probe 100 sideslips slightly.
[0038] When actually measured, the amount of scrubs (the amount of horizontal migration at the tip 141 of a probe 100) at the time of an overdrive (about 13g and 100 micrometers) was about 5 micrometers on the average, and the spring pressure of the contact section 140 of a probe 100 was suitable. In addition, the magnitude of the electrode pad 611 is for example, 100-micrometer angle extent.
[0039] Thus, since a suitable scrub phenomenon generates the probe card concerning the gestalt of operation of this invention, the tip 141 of the contact section 140 of a probe 100 can prevent contact resistance increasing by oxidation, foreign matter adhesion, etc.
[0040] Moreover, in the case of the probe card concerning the gestalt of operation of this invention, the probe 100 which produced fault gets mixed up with removing the jumping wire 700 connected to the end face, is only removed from the adhesives layer 270 which is fixing the end face side of a probe 100, and can be drawn out caudad easily. Moreover, the new probe 100 is easy to insert from the end face side. The contact section 140 in which the bending sections 142A and 142B of a probe 100 are formed is arranged below the bottom support substrate 220, and it is because the vertical section 160 of the probe 100 currently supported by the probe supporter material 200 is formed in the shape of a straight line. In addition, adhesives are applied and the inserted probe 100 is fixed, while the jumping wire 700 is again connected to the end face. Thus, at least one is easy at a time for exchange of some probes 100 which produced fault.
[0041] Moreover, since it has the probe 100 which in the case of the probe card concerning the gestalt of operation of this invention hangs from a substrate 300 and contacts the electrode pad 611 at an abbreviation perpendicular, it is having fundamentally structure of going into the category of a vertical-type probe card, and a probe 100 can be formed in high density.
[0042] Moreover, it is the possible structure of carrying out elastic deformation which does not need to form specially

more thinly than others and has allowances at the time of an overdrive between bending section 142A of the contact section 140 of a probe 100, and 142B. That is, magnitude of the elasticity limit of this probe 100 can be made into a large condition.

[0043] In addition, in the probe card concerning the gestalt of operation of this invention, the magnitude of the elasticity limit of a probe 100 and said spring pressure can be adjusted by changing the size dimension between bending section 142A and 142B. Moreover, the magnitude of said elasticity limit of a probe 100, said spring pressure, and said amount of scrubs can be adjusted by changing the die-length dimension between bending section 142A and 142B.

[0044] Furthermore, said amount of scrubs can be adjusted by changing said bending include angle. Although said bending include angle has 90 desirable degrees or more, 90 degrees, with the done thing to do are also possible for it. When said bending include angle turns into 90 or less degrees, bending section 142B of the end face approach of a probe 100 will be arranged in a location always lower than bending section 142A of tip 141 approach. Therefore, cautions are required on a design so that bending section 142B of said vertical section 160 approach may not contact a wafer 600 at the time of an overdrive.

[0045] In the case of the probe card concerning the gestalt of operation of this invention, the bending section set to two, but, of course, the three or more bending sections may be formed. However, since a man day increases in order to form the three or more bending sections, two are more desirable in manufacturing cost.

[0046] Moreover, considering as the one bending section is also possible. In this case, in order to make it contact an electrode pad at an abbreviation perpendicular, the tip of a probe is incurvated, for example and the bending section comes to form it. In this case, on manufacture, since it is time and effort, two are more desirable than the time of the two bending sections in manufacturing cost.

[0047] In addition, the tip of a probe is made to contact an abbreviation perpendicular at the electrode pad 611 because the tip of a probe is certainly influenced according to a scrub phenomenon of friction by the side of the front face of the electrode pad 611 etc. since the tip of a probe is hardly influenced of friction by the side of the front face of the electrode pad 611 etc. at the time of an overdrive when the tip of a probe contacts the electrode pad 611 at a shallow include angle -- on the way -- it is because it comes out, and a possibility of sideslipping, seeing from the electrode pad 611 and coming out becomes high, without stopping. Of course, since a test result will become the mistaken thing if the tip of a probe overflows the electrode pad 611, it is necessary to make it not be in such a condition.

[0048] Therefore, if the tip of a probe is made to contact the electrode pad 611 at an abbreviation perpendicular at the time of the one bending section when [said] making it curve, not forming, but bending, while it has been simply straight, most probes will become straight line-like, for example. In this case, since there is a possibility of damaging the electrode pad 611, the way things stand at the time of an overdrive, it is good to prepare the buckling section (to refer to following) separately.

[0049] By the way, although the vertical section 160 of a probe 100 presupposes that it is a straight line-like in the case of the probe card concerning the gestalt of operation of this invention and especially the path is made the same, it is a part of this vertical section 160, and is good also as the buckling section which formed more thinly than others the part located in the clearance between the bottom support substrate 210 and the bottom support substrate 220. Thereby, the buckling section can also make the force applied at the time of an overdrive absorb in addition to the bending section. Therefore, the field which may come to enlarge spring pressure of the part applied at a tip from the bending section most prepared in the end face side in this case, and a tip flank occupies by plane view can be made smaller. That is, it becomes possible to crowd more and to form a probe.

[0050]

[Effect of the Invention] From the substrate which constitutes a probe card, the probe applied to claim 1 of this invention as explained above hangs, and is arranged, and it is the probe which contacts the electrode pad formed in the measuring object object at an abbreviation perpendicular, and it bends at a tip, an include angle is made into 90 degrees or more, and it has at least two bending sections which bend mutually conversely and are formed in it.

[0051] Therefore, the probe concerning claim 1 of this invention can be formed in a probe card at high density. Moreover, the part (it is also called a sideways part.) which is a part by the side of a tip, and is not the part of the direction of a perpendicular from the bending section with most the bottom demonstrates the function as an elastic body eased as it is also at resiliency about the force of the direction of a perpendicular at the time of an overdrive rather than the part of the direction of a perpendicular. Since it is not necessary to form said sideways part extraordinarily more thinly than others, it turns into a part which carries out elastic deformation which has allowances at the time of an overdrive.

[0052] Furthermore, when prepared in a probe card, as for the probe which hangs from a substrate, it is common that the vertical section of a probe is supported by probe supporter material. That is, the contact section which is the tip side of a probe equipped with the bending section is a part which is not supported by probe supporter material. And the vertical

section of a probe is not necessarily equipped especially with the part to which said probe has a possibility of causing trouble in the exchange per. Therefore, while it is possible to draw out one [at a time] the probe which said fault produced from probe supporter material convenient to the down side for fault to arise in some probes and exchange for them the probe which hangs from a substrate, a new probe can set the vertical section of a probe from the bottom convenient to probe supporter material.

[0053] Therefore, the probe concerning claim 1 of this invention is a probe which can be formed in a probe card at high density, and has made the maintenance cost lower than before.

[0054] On the other hand, the probe card concerning claim 2 of this invention The substrate with which the circuit pattern was formed, and two or more probes which are electrically connected to said circuit pattern and are arranged by hanging from a substrate, It was prepared in the inferior-surface-of-tongue side of said substrate, and has the probe supporter material which supports said probe, and at the tip which projects below probe supporter material, said probe makes a bending include angle 90 degrees or more, and has at least two bending sections which bend mutually conversely and are formed in it.

[0055] Since the probe concerning said claim 1 is used for this probe card, it can acquire the same effectiveness as ****.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Field of the Invention] This invention relates to the probe used in case many electric properties, such as a semiconductor integrated circuit formed in measuring object objects, such as a wafer, are measured, and the probe card using this.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

PRIOR ART

[Description of the Prior Art] The conventional probe card is divided roughly into the horizontal-type type which uses the sideways probe called a cantilever mold, and the vertical mold type which uses the probe 100 of the vertical mold called a vertical type as shown in drawing 3 .
[0003] The conventional horizontal-type probe card is equipped with two or more probes with which the whole is abbreviation sideways, and the point was usually bent and formed in the direction of a perpendicular, the substrate with which the circuit pattern to which this probe is connected was formed, and the probe susceptor attached in the inferior surface of tongue of this substrate. The mountain side section of a probe is being fixed to the bottom taper side of probe susceptor with adhesives.
[0004] On the other hand, the conventional vertical-type probe card (it is also hereafter called the 1st conventional vertical-type probe card.) shown in drawing 3 Two or more probes 100 which contact at right angles to the electrode pad 611 of the semiconductor integrated circuit 610 formed in the wafer 600 which is a measuring object object, It was prepared in the inferior-surface-of-tongue side of the substrate 300 with which the circuit pattern to which this probe 100 is connected was formed, and this substrate 300, and has the probe supporter material 200 which supports the vertical section 160 of said probe 100.
[0005] The flection 130 which bent the probe 100 in the shape of ****** to the vertical section 160, and was formed is formed. This flection 130 is formed in order to control contact pressure so that the point 110 of a probe 100 may damage the electrode pad 611 of a semiconductor integrated circuit 610 and may not make it damage at the time of the overdrive mentioned later.
[0006] The probe supporter material 200 consists of epoxy system adhesives layers 270 which are applied to the top face of the bottom support substrate 210 and the bottom support substrate 220 which were supported in parallel with a substrate 300, and the bottom support substrate 210 by the supporter material 250 and this supporter material 250 of the shape of a rod which hung from the inferior surface of tongue of a substrate 300, and fix a probe 100 by them.
[0007] Two or more through tubes 211 and 221 corresponding to arrangement of the electrode pad 611 formed in the wafer 600 are established by the bottom support substrate 210 and the bottom support substrate 220, respectively. While being positioned and supported because a probe 100 penetrates these through tubes 211 and 221, contact of probe 100 adjoining comrades is also prevented beforehand. In addition, the flection 130 of a probe 100 is formed so that it may be located in the clearance between the bottom support substrate 210 and the bottom support substrate 220.
[0008] The end face section of a probe 100 is inserted in the through hole 311 of a substrate 300, and is soldered to the electrode 310 formed in the top face of a substrate 300 through the jumping wire 700.
[0009] There is also another conventional vertical-type probe card which changed a part of structure of the probe 100 of such 1st conventional vertical-type probe card as follows. Another vertical-type probe card of this former is also hereafter called the 2nd conventional vertical-type probe card.
[0010] Instead of the flection 130 of said probe 100, the probe of the 2nd conventional vertical-type probe card prepares the straight-line-like buckling section, and absorbs the force at the time of the overdrive later mentioned by the buckling of this buckling section. Therefore, as for the probe which has this buckling section, the whole is formed in the shape of a straight line. In addition, it is fixed to the bottom support substrate 210 as well as [the probe which has said buckling section] said probe 100 with epoxy system adhesives.
[0011] Thus, it is fixed to the standing ways 800 shown in drawing 3 , respectively by the conclusion member 811 when the constituted conventional horizontal-type probe card (the circumference device of a probe card is referring to drawing 3), the 1st conventional vertical-type probe card, or the 2nd conventional vertical-type probe card is used for the test of a wafer 600. These standing ways 800 are established in the tip side of the test computer which is not illustrated. The movable table 700 on which a wafer 600 is set is formed in the horizontal-type probe card [which was fixed to these

standing ways 800], or vertical-type probe card bottom.
[0012] Hereafter, it explains centering on the 1st conventional vertical-type probe card. A test computer is connected to the terminal 320 of the top face of the substrate 300 of the vertical-type probe card fixed to standing ways 800. It is set to the movable table 700 by the automatic taking-out close equipment which a wafer 600 does not illustrate. A wafer 600 is raised on the movable table 700, and the electrode pad 611 of the semiconductor integrated circuit 610 formed in the wafer 600 contacts the point 110 of a probe 100.
[0013] After this contact, in order to secure perfect contact, further, the movable table 700 is raised several 10- 100 and dozens of micrometers, and the electrode pad 611 is pushed against the point 110 of a probe 100. This is called overdrive.
[0014] The electrical signal from a test computer is exchanged with the semiconductor integrated circuit 610 formed in the wafer 600 through a terminal 320, an electrode 310, the jumping wire 700, and a probe 100, and a test is performed. After a test is completed, the movable table 700 is once lowered and carries out horizontal migration by the dimension of the semiconductor integrated circuit 610 which the test ended. Then, again, the movable table 700 is raised and the next test is performed.
[0015] In addition, also in the 2nd conventional vertical-type probe card, it is [of the 1st conventional vertical-type probe card mentioned above] the same.
[0016] On the other hand, in the case of the conventional horizontal-type probe card, fundamentally, although it is the same, the actuation at the time of an overdrive differs from the case of the 1st conventional vertical-type probe card a little as follows.
[0017] Namely, in the case of the conventional horizontal-type probe card, a tip side field is pushed up by the bottom rather than the part currently fixed to probe susceptor among probes at the time of said overdrive. The segment which connects the end face point and tip point of said tip side field is not level, and has become a thing with an inclination. Therefore, using the end face point of said tip side field as the supporting point, if the tip of a probe is pushed up at the time of an overdrive, it is raised so that an arc may be drawn mostly. That is, a part of force of the direction of a perpendicular which starts at the tip of a probe at the time of an overdrive changes to horizontal component of a force, and the tip of a probe sideslips slightly. Since the tip of a probe will be in the condition of sideslipping grinding the front-face side of the electrode pad 611 opposing friction etc., generally this phenomenon is called a scrub (GOSHIGOSHI **** thing). According to this phenomenon, the point of a probe prevents contact resistance increasing by oxidation, foreign matter adhesion, etc., and there is effectiveness refreshed for said point.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

EFFECT OF THE INVENTION

[Effect of the Invention] From the substrate which constitutes a probe card, the probe applied to claim 1 of this invention as explained above hangs, and is arranged, and it is the probe which contacts the electrode pad formed in the measuring object object at an abbreviation perpendicular, and it bends at a tip, an include angle is made into 90 degrees or more, and it has at least two bending sections which bend mutually conversely and are formed in it.
[0051] Therefore, the probe concerning claim 1 of this invention can be formed in a probe card at high density. Moreover, the part (it is also called a sideways part.) which is a part by the side of a tip, and is not the part of the direction of a perpendicular from the bending section with most the bottom demonstrates the function as an elastic body eased as it is also at resiliency about the force of the direction of a perpendicular at the time of an overdrive rather than the part of the direction of a perpendicular. Since it is not necessary to form said sideways part extraordinarily more thinly than others, it turns into a part which carries out elastic deformation which has allowances at the time of an overdrive.
[0052] Furthermore, when prepared in a probe card, as for the probe which hangs from a substrate, it is common that the vertical section of a probe is supported by probe supporter material. That is, the contact section which is the tip side of a probe equipped with the bending section is a part which is not supported by probe supporter material. And the vertical section of a probe is not necessarily equipped especially with the part to which said probe has a possibility of causing trouble in the exchange per. Therefore, while it is possible to draw out one [at a time] the probe which said fault produced from probe supporter material convenient to the down side for fault to arise in some probes and exchange for them the probe which hangs from a substrate, a new probe can set the vertical section of a probe from the bottom convenient to probe supporter material.
[0053] Therefore, the probe concerning claim 1 of this invention is a probe which can be formed in a probe card at high density, and has made the maintenance cost lower than before.
[0054] It connected with the substrate with which the circuit pattern was formed, and said circuit pattern electrically, and the probe card applied to claim 2 of this invention on the other hand was prepared in the two or more probes [which are arranged by hanging from a substrate], and inferior-surface-of-tongue side of said substrate, and is equipped with the probe supporter material which supports said probe. At the tip which projects below probe supporter material, said probe makes a bending include angle 90 degrees or more, and has at least two bending sections which bend mutually conversely and are formed in it.
[0055] Since the probe concerning said claim 1 is used for this probe card, it can acquire the same effectiveness as ****.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Although the conventional horizontal-type probe card has the outstanding description which was mentioned above, and the description mentioned later, since it arranges the probe sideways, it is structure unsuitable for forming a probe in high density, and its degree of freedom of arrangement of a probe is also lower than the conventional vertical-type probe card (the 1st or the 2nd). Therefore, the vertical-type probe card has come to be brought into the limelight rather than a horizontal-type probe card as the requests of the coincidence test of many semiconductor integrated circuits in accordance with high integration and detailed-izing of a semiconductor integrated circuit, and multiplexing of a test computer mount in recent years.

[0019] However, when in the case of the 1st conventional vertical-type probe card a damage is given and at least one fault arises among the probes of hundreds prepared during handling - 1000 numbers, it cannot exchange easily. since [that is,], as for a probe, a flection is located in the clearance between a bottom support substrate and a bottom support substrate -- the upper and lower sides -- there is difficulty on repair that it can draw out to neither.

[0020] In addition, there are many vertical-type probe cards in which the coincidence test of many semiconductor integrated circuits is possible, and since it has thousands of probes, and it is expensive, naturally repair is needed. It is a fault that unlike the conventional horizontal-type probe card with which exchange of a probe is in the comparatively easy installation condition at this time it cannot exchange some defects' probe one [at a time] easily when it is the 1st conventional vertical-type probe card.

[0021] Said 2nd conventional vertical-type probe card solved this problem, i.e., the problem which cannot exchange one probe of some defects at a time easily. As mentioned above, the whole of the probe of the 2nd conventional vertical-type probe card is a straight line-like. therefore -- if it removes from the adhesives which some probes which produced fault get mixed up with removing the jumping wire connected to the end face, and are fixing the end face side of a probe -- the upper and lower sides -- it can draw out to all and a new probe can also be inserted. Therefore, in the case of the 2nd conventional vertical-type probe card, the exchange per of a probe is easy.

[0022] However, in the 2nd conventional vertical-type probe card equipped with the probe which has the buckling section, the buckling according to bending of ** in the bow of the buckling section is performed in the part near an elasticity limit, and it is common for there to be little allowances. Therefore, in order for a probe to sometimes cause plastic deformation and to be equal to the measurement which is about 1 million times, it may apply to dependability.

[0023] Moreover, since the scrub phenomenon in which the tip of a probe sideslips slightly does not occur in the case of the conventional 1st and the 2nd vertical-type probe card, when a test is repeated and a real time becomes long, there is a problem that the contact resistance of a probe increases.

[0024] The main purpose of this invention is prepared in high density, and carries out elastic deformation which has allowances at the time of an overdrive, and offering an easy probe and the probe card using this has the exchange per. It is in offering the probe for which it can be prevented combining and contact resistance's increasing, and the probe card using this.

[Translation done.]

MEANS

[Means for Solving the Problem] The probe applied to claim 1 of this invention in order to solve the above-mentioned problem is a probe which contacts the electrode pad which hung, has been arranged from the substrate which constitutes a probe card, and was formed in the measuring object object at an abbreviation perpendicular, is bent at a tip, makes an include angle 90 degrees or more, and it has at least two bending sections which bend mutually conversely and are formed in it.

[0026] The substrate with which, as for the probe card concerning claim 2 of this invention, the circuit pattern was formed, Two or more probes which are electrically connected to said circuit pattern and are arranged by hanging from a substrate, It was prepared in the inferior-surface-of-tongue side of said substrate, and has the probe supporter material which supports said probe, and at the tip which projects below probe supporter material, said probe makes a bending include angle 90 degrees or more, and has at least two bending sections which bend mutually conversely and are formed in it.

[0027]

[Embodiment of the Invention] Hereafter, the probe card concerning the gestalt of operation of this invention using the probe of this invention is explained, referring to drawing 1 and drawing 2 . In addition, the probe card concerning the gestalt of operation of this invention is used instead of the conventional vertical-type probe card shown in said drawing 3 , being fixed to the standing ways 800 shown in drawing 3 . The rough cross-section explanatory view showing the probe card which drawing 1 requires for the gestalt of operation of this invention, and drawing 2 are the rough front views showing the tip side of the probe used for the probe card concerning the gestalt of operation of this invention.

[0028] The probe card concerning the gestalt of operation of this invention The substrate 300 with which the circuit pattern (illustration abbreviation) was formed, and two or more probes 100 which are electrically connected to said circuit pattern and are arranged by hanging from a substrate 300, It was prepared in the inferior-surface-of-tongue side of said substrate 300, and has the probe supporter material 200 which supports said probe 100, and said probe 100 is the tip which projects below the probe supporter material 200. A bending include angle is made into 90 degrees or more, and it has the two bending sections 142A and 142B which bend mutually conversely and are formed in it.

[0029] Said probe 100 has the two bending sections 142A and 142B in the straight-line-like vertical section 160 and the contact section 140 which is the tip side of this vertical section 160. The bending sections 142A and 142B make a bending include angle 90 degrees or more, for example, 100 degrees, are bent mutually conversely and formed in it. It becomes a sideways part between bending section 142A and 142B, and it demonstrates the function as a spring at the time of an overdrive. The tip side is an abbreviation perpendicular from bending section 142A so that the electrode pad 611 may be contacted at an abbreviation perpendicular.

[0030] A probe 100 is formed as follows, for example. First, electrolytic polishing of the tungsten wire containing with a diameter of 50 micrometers RENYUUMU 3% is carried out, and what sharpened the tip is formed. About this thing, it cuts in the location where the diameter at a tip becomes 25 micrometers, and from this location, it cuts further in the location of 12mm, and a straight-line-like thing is obtained. It bends 100 degrees in the location of 1mm from the edge (namely, part used as the tip 141 of the contact section 140 of a probe 100) at which the thing of the shape of this straight line is sharp, and it is referred to as bending section 142A, it bends from this bending section 142A 100 degrees to hard flow in the location of 2 moremm, and is referred to as bending section 142B. In addition, in drawing 2 , the tip 141 of a probe 100 is sharpened on illustration so that intelligibly [the migration situation at the tip 141], but in fact, as mentioned above, the diameter is formed in 25 micrometers.

[0031] The probe supporter material 200 consists of adhesives layers 270, such as an epoxy system which is applied to the top face of the bottom support substrate 210 and the bottom support substrate 220 which were supported in parallel with a substrate 300, and the bottom support substrate 210 by the supporter material 250 and this supporter material 250 of the

shape of a rod which hung from the inferior surface of tongue of a substrate 300, and fixes a probe 100 by them.
[0032] Two or more through tubes 211 and 221 corresponding to arrangement of the electrode pad 611 formed in the wafer 600 are established by the bottom support substrate 210 and the bottom support substrate 220, respectively. While being positioned and supported because a probe 100 penetrates these through tubes 211 and 221, contact of probe 100 adjoining comrades is also prevented beforehand.
[0033] In addition, the bottom support substrate 210 and the bottom support substrate 220 are machinable ceramics (for example, trade name MASERAITO of Mitsui Mining Co., Ltd. etc. is suitable.) with a thickness of 0.25mm. The magnitude of a through tube 211 is the size which can insert the vertical section 160 of a probe 100. That is, the magnitude of a through tube 211 is good at larger extent a little than 50 micrometers. Moreover, the magnitude of a through tube 221 is a little larger 60 micrometers than size 50micrometer of the vertical section 160 of a probe 100.
[0034] The through hole 311 which can insert the end face of a probe 100 in the location used as said the shape of through tubes 211 and 221 and a straight line is formed in the substrate 300. The electrode 310 to which the end face of a probe 100 is connected through the jumping wire 700, and the terminal 320 to which the test computer which is not illustrated is connected are formed in the top face of a substrate 300. The through tube (illustration abbreviation) for conclusion members (illustration abbreviation) fixed to the standing ways 800 shown in the substrate 300 at drawing 3 is prepared.
[0035] Thus, in case the probe card concerning the gestalt of operation of constituted this invention is assembled, the vertical section 160 of a probe 100 is inserted in through tubes 221 and 211, and it inserts in a through hole 311 further. The end face of the vertical section 160 of a probe 100 is connected to the jumping wire 700. In addition, for example, the bottom support substrate 210, the bottom support substrate 220, and distance of a between are set to 5mm, and are assembled.
[0036] On the other hand, the other end of the jumping wire 700 is connected to an electrode 310. In addition, although the adhesives layer 270 is formed in the top face of the bottom support substrate 210 by spreading instead, it may be prepared in the inferior surface of tongue of the bottom support substrate 210, and, of course, may be prepared in the top face and inferior surface of tongue of the bottom support substrate 210.
[0037] Thus, the conclusion member which is not illustrated to the standing ways 800 shown in drawing 3 is fixed, and the probe card concerning the gestalt of operation of assembled this invention is used for the test of a wafer 600. When the electrode pad 611 of the semiconductor integrated circuit 610 formed in the wafer 600 set to the movable table 700 is pushed up in the direction of a perpendicular to the tip 141 of the contact section 140 of a probe 100 at the time of an overdrive, a probe 100 comes to be shown in drawing 2 . Namely, by using bending section 142B as the supporting point, the tip 141 of the contact section 140 of a probe 100 is raised so that an arc may be drawn mostly. That is, a part of force of the direction of a perpendicular which starts at the tip 141 of the contact section 140 of a probe 100 at the time of an overdrive changes to horizontal component of a force, and the tip 141 of a probe 100 sideslips slightly.
[0038] When actually measured, the amount of scrubs (the amount of horizontal migration at the tip 141 of a probe 100) at the time of an overdrive (about 13g and 100 micrometers) was about 5 micrometers on the average, and the spring pressure of the contact section 140 of a probe 100 was suitable. In addition, the magnitude of the electrode pad 611 is for example, 100-micrometer angle extent.
[0039] Thus, since a suitable scrub phenomenon generates the probe card concerning the gestalt of operation of this invention, the tip 141 of the contact section 140 of a probe 100 can prevent contact resistance increasing by oxidation, foreign matter adhesion, etc.
[0040] Moreover, in the case of the probe card concerning the gestalt of operation of this invention, the probe 100 which produced fault gets mixed up with removing the jumping wire 700 connected to the end face, is only removed from the adhesives layer 270 which is fixing the end face side of a probe 100, and can be drawn out caudad easily. Moreover, the new probe 100 is easy to insert from the end face side. The contact section 140 in which the bending sections 142A and 142B of a probe 100 are formed is arranged below the bottom support substrate 220, and it is because the vertical section 160 of the probe 100 currently supported by the probe supporter material 200 is formed in the shape of a straight line. In addition, adhesives are applied and the inserted probe 100 is fixed, while the jumping wire 700 is again connected to the end face. Thus, at least one is easy at a time for exchange of some probes 100 which produced fault.
[0041] Moreover, since it has the probe 100 which in the case of the probe card concerning the gestalt of operation of this invention hangs from a substrate 300 and contacts the electrode pad 611 at an abbreviation perpendicular, it is having fundamentally structure of going into the category of a vertical-type probe card, and a probe 100 can be formed in high density.
[0042] Moreover, it is the possible structure of carrying out elastic deformation which does not need to form specially more thinly than others and has allowances at the time of an overdrive between bending section 142A of the contact section 140 of a probe 100, and 142B. That is, magnitude of the elasticity limit of this probe 100 can be made into a large

conditions.

[0043] In addition, in the probe card concerning the gestalt of operation of this invention, the magnitude of the elasticity limit of a probe 100 and said spring pressure can be adjusted by changing the size dimension between bending section 142A and 142B. Moreover, the magnitude of said elasticity limit of a probe 100, said spring pressure, and said amount of scrubs can be adjusted by changing the die-length dimension between bending section 142A and 142B.

[0044] Furthermore, said amount of scrubs can be adjusted by changing said bending include angle. Although said bending include angle has 90 desirable degrees or more, 90 degrees, with the done thing to do are also possible for it. When said bending include angle turns into 90 or less degrees, bending section 142B of the end face approach of a probe 100 will be arranged in a location always lower than bending section 142A of tip 141 approach. Therefore, cautions are required on a design so that bending section 142B of said vertical section 160 approach may not contact a wafer 600 at the time of an overdrive.

[0045] In the case of the probe card concerning the gestalt of operation of this invention, the bending section set to two, but, of course, the three or more bending sections may be formed. However, since a man day increases in order to form the three or more bending sections, two are more desirable in manufacturing cost.

[0046] Moreover, considering as the one bending section is also possible. In this case, in order to make it contact an electrode pad at an abbreviation perpendicular, the tip of a probe is incurvated, for example and the bending section comes to form it. In this case, on manufacture, since it is time and effort, two are more desirable than the time of the two bending sections in manufacturing cost.

[0047] In addition, the tip of a probe is made to contact an abbreviation perpendicular at the electrode pad 611 because the tip of a probe is certainly influenced according to a scrub phenomenon of friction by the side of the front face of the electrode pad 611 etc. since the tip of a probe is hardly influenced of friction by the side of the front face of the electrode pad 611 etc. at the time of an overdrive when the tip of a probe contacts the electrode pad 611 at a shallow include angle -- on the way -- it is because it comes out, and a possibility of sideslipping, seeing from the electrode pad 611 and coming out becomes high, without stopping. Of course, since a test result will become the mistaken thing if the tip of a probe overflows the electrode pad 611, it is necessary to make it not be in such a condition.

[0048] Therefore, if the tip of a probe is made to contact the electrode pad 611 at an abbreviation perpendicular at the time of the one bending section when [said] making it curve, not forming, but bending, while it has been simply straight, most probes will become straight line-like, for example. In this case, since there is a possibility of damaging the electrode pad 611, the way things stand at the time of an overdrive, it is good to prepare the buckling section (to refer to following) separately.

[0049] By the way, although the vertical section 160 of a probe 100 presupposes that it is a straight line-like in the case of the probe card concerning the gestalt of operation of this invention and especially the path is made the same, it is a part of this vertical section 160, and is good also as the buckling section which formed more thinly than others the part located in the clearance between the bottom support substrate 210 and the bottom support substrate 220. Thereby, the buckling section can also make the force applied at the time of an overdrive absorb in addition to the bending section. Therefore, the field which may come to enlarge spring pressure of the part applied at a tip from the bending section most prepared in the end face side in this case, and a tip flank occupies by plane view can be made smaller. That is, it becomes possible to crowd more and to form a probe.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the rough cross-section explanatory view showing the probe card concerning the gestalt of operation of this invention.
[Drawing 2] It is the rough front view showing the tip side of the probe used for the probe card concerning the gestalt of operation of this invention.
[Drawing 3] It is the rough cross-section explanatory view showing a conventional vertical-type probe card and its conventional circumference device.
[Description of Notations]
100 Probe
140 Contact Section
142A Bending section
142B Bending section
160 Vertical Section
200 Probe Supporter Material
300 Substrate

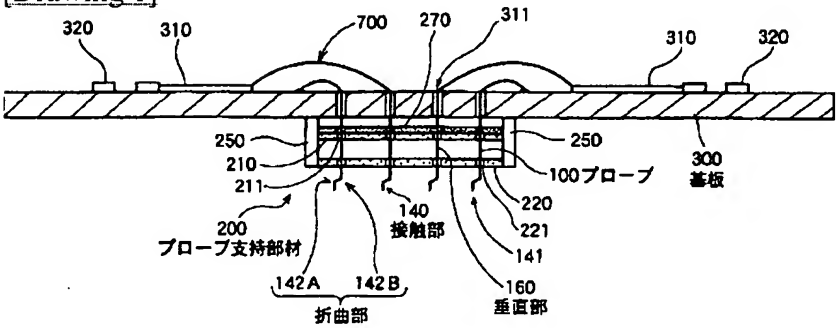
[Translation done.]

* NOTICES *

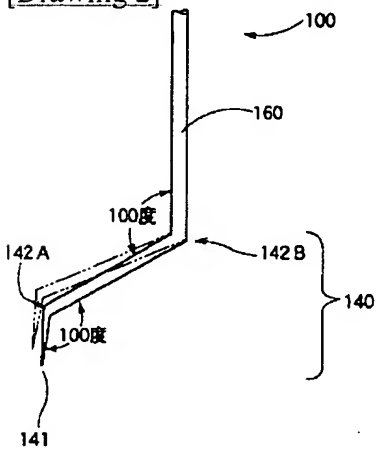
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

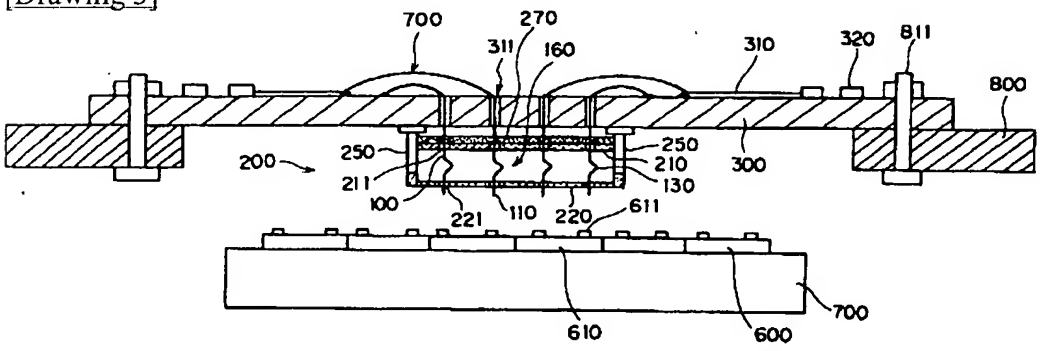
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Translation done.]

(19)日本国特許庁（ＪＰ）　(12) **公開特許公報**（Ａ）　(11)特許出願公開番号
特開2001－41978
（P2001－41978A）
(43)公開日　平成13年２月16日(2001.2.16)

(51)Int.Cl.'	識別記号	ＦＩ		テーマコード'（参考）
Ｇ０１Ｒ　1/067		Ｇ０１Ｒ　1/067	Ｇ	２Ｇ０１１
1/073		1/073	Ｅ	４Ｍ１０６
Ｈ０１Ｌ　21/66		Ｈ０１Ｌ　21/66	Ｂ	

審査請求　有　　請求項の数２　ＯＬ　（全　７　頁）

(21)出願番号　特願平11－216851

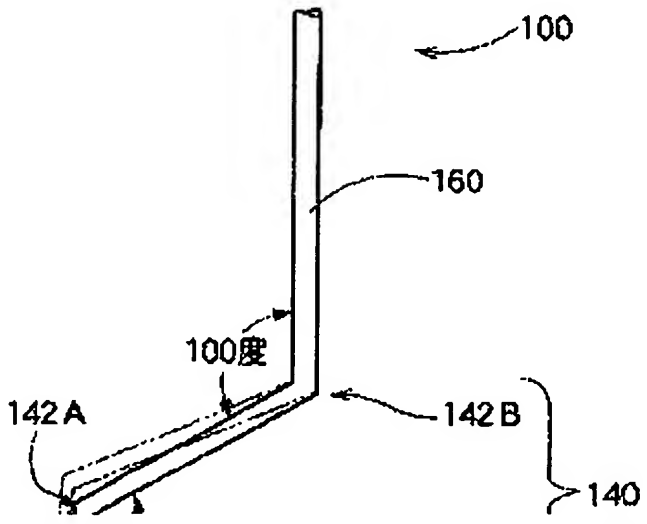
(22)出願日　平成11年７月30日(1999.7.30)

(71)出願人　000232405
日本電子材料株式会社
兵庫県尼崎市西長洲町２丁目５番13号
(72)発明者　大久保　昌男
兵庫県尼崎市西長洲町２丁目５番13号　日本電子材料株式会社内
(72)発明者　大久保　和正
兵庫県尼崎市西長洲町２丁目５番13号　日本電子材料株式会社内
(74)代理人　100085936
弁理士　大西　孝治　（外１名）

最終頁に続く

(54)【発明の名称】　プローブ及びこれを用いたプローブカード

(57)【要約】
【目的】　プローブを高密度に設けることができ、オーバードライブ時に余裕のある弾性変形をし、１本ずつの交換が容易とする。
【構成】　配線パターン３１０が形成された基板３００と、前記配線パターン３１０に電気的に接続されて基板３００から垂下されて配置される複数のプローブ１００と、前記基板３００の下面側に設けられ、前記プローブ１００を支持するプローブ支持部材２００とを備えており、前記プローブ１００はプローブ支持部材２００より下側に突出する先端で、折り曲げ角度を９０度以上にして相互に逆に折り曲げ形成されている２つの折曲部１４２Ａ　１４２Ｂを有している。



1

【特許請求の範囲】

【請求項１】　プローブカードを構成する基板から垂下されて配置され、測定対象物に形成された電極パッドに略垂直に接触するプローブであって、先端には折り曲げ角度を９０度以上にして相互に逆に折り曲げ形成されている少なくとも２つの折曲部を有することを特徴とするプローブ。

【請求項２】　配線パターンが形成された基板と、前記配線パターンに電気的に接続されて基板から垂下されて配置される複数のプローブと、前記基板の下面側に設けられ、前記プローブを支持するプローブ支持部材とを具備しており、前記プローブはプローブ支持部材より下側に突出する先端で、折り曲げ角度を９０度以上にして相互に逆に折り曲げ形成されている少なくとも２つの折曲部を有することを特徴とするプローブカード。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、ウエハ等の測定対象物に形成された半導体集積回路等の電気的諸特性を測定する際に用いられるプローブ及びこれを用いたプローブカードに関する。

【０００２】

【従来の技術】従来のプローブカードは、カンチレバー型と呼ばれる横向きのプローブを使用する横型タイプと、図３に示すように、垂直型と呼ばれる縦型のプローブ１００を使用する縦型タイプとに大別される。

【０００３】従来の横型プローブカードは、通常、全体が略横向きで且つ先端部が垂線方向に折り曲げ形成された複数のプローブと、このプローブが接続される配線パターンが形成された基板と、この基板の下面に取り付けられたプローブ支持台とを備えたものである。プローブの中腹部は、プローブ支持台の下側テーパ面に接着剤で固定されている。

【０００４】一方、図３に示す従来の垂直型プローブカード（以下、従来の第１の垂直型プローブカードとも呼ぶ。）は、測定対象物であるウエハ６００に形成された半導体集積回路６１０の電極パッド６１１に垂直に接触する複数のプローブ１００と、このプローブ１００が接続される配線パターンが形成された基板３００と、この基板３００の下面側に設けられ、前記プローブ１００の垂直部１６０を支持するプローブ支持部材２００とを備えている。

【０００５】プローブ１００は、垂直部１６０に略直

2

部材２５０によって、基板３００と平行に支持された上側支持基板２１０および下側支持基板２２０と、上側支持基板２１０の上面に塗布されてプローブ１００を固定するエポキシ系接着剤層２７０とで構成されている。

【０００７】上側支持基板２１０と下側支持基板２２０とには、ウエハ６００に形成された電極パッド６１１の配置に対応した複数個の貫通孔２１１、２２１がそれぞれ開設されている。この貫通孔２１１、２２１をプローブ１００が貫通することで位置決めされて支持されるとともに、隣接するプローブ１００同士の接触も未然に防止している。なお、プローブ１００の屈曲部１３０は、上側支持基板２１０と下側支持基板２２０との間の隙間に位置するように設けられている。

【０００８】プローブ１００の基端部は、基板３００のスルーホール３１１に挿入されて、ジャンピングワイヤ７００を介して基板３００の上面に形成された電極３１０に半田付けされている。

【０００９】このような従来の第１の垂直型プローブカードのプローブ１００の構造の一部を次のように変更した従来の別の垂直型プローブカードもある。この従来の別の垂直型プローブカードを以下、従来の第２の垂直型プローブカードとも呼ぶ。

【００１０】従来の第２の垂直型プローブカードのプローブは、前記プローブ１００の屈曲部１３０の代わりに、直線状の座屈部を設け、この座屈部の座屈で後述するオーバードライブ時の力を吸収するものである。したがって、この座屈部を有するプローブは、全体が直線状に形成されている。なお、前記座屈部を有するプローブも、前記プローブ１００と同様に、上側支持基板２１０にエポキシ系接着剤で固定されている。

【００１１】このように構成された従来の横型プローブカード（プローブカードの周辺機構は図３参照）または従来の第１の垂直型プローブカード若しくは従来の第２の垂直型プローブカードがウエハ６００のテストに使用されるときには、それぞれ図３に示された固定台８００に締結部材８１１によって固定される。この固定台８００は、図示しないテストコンピュータの先端側に設けられたものである。この固定台８００に固定された横型プローブカードまたは垂直型プローブカードの下側には、ウエハ６００がセットされる可動テーブル７００が設けられている。

【００１２】以下、従来の第１の垂直型プローブカードを中心に説明する。固定台８００に固定された垂直型プ

【００１３】この接触後．完全な接触を確保するために．更に可動テーブル７００は、数十～百数十μｍ上昇させられて、プローブ１００の先端部１１０に電極パッド６１１が押しつけられる。これをオーバードライブと言う。

【００１４】テストコンピュータからの電気信号が、端子３２０、電極３１０、ジャンピングワイヤ７００、プローブ１００を介して、ウエハ６００に形成された半導体集積回路６１０とやりとりされてテストが行われる。テストが終了すると、可動テーブル７００は一旦下げられ．テストが終了した半導体集積回路６１０の寸法分だけ水平移動させられる。この後、再度．可動テーブル７００が上昇させられて、次のテストが行われる。

【００１５】なお、従来の第２の垂直型プローブカードの場合も、上述した従来の第１の垂直型プローブカードの場合と同様である。

【００１６】一方、従来の横型プローブカードの場合には．基本的に従来の第１の垂直型プローブカードの場合と同様であるが．オーバードライブ時の動作が次のようにやや異なる。

【００１７】即ち、従来の横型プローブカードの場合には．プローブのうちで、プローブ支持台に固定されている部分よりも先端側領域が．前記オーバードライブ時に上側に押し上げられる。前記先端側領域の基端点と先端点とを結ぶ線分は、水平でなく傾斜を有したものとなっている。そのため、プローブの先端は．オーバードライブ時に押し上げられると．前記先端側領域の基端点を支点としつつ、ほぼ弧を描くように上昇させられる。即ち．オーバードライブ時に．プローブの先端にかかる垂線方向の力の一部が、水平方向の分力に変わり．プローブの先端は僅かに横滑りする。この現象は、プローブの先端が電極パッド６１１の表面側を摩擦等に対抗しつつ擦りながら横滑りする状態となるので．一般にスクラブ（ゴシゴシ擦ること）と呼ばれる。この現象によって、プローブの先端部が酸化や異物付着などで接触抵抗が増大するのを防ぎ．前記先端部をリフレッシュする効果がある。

【００１８】

【発明が解決しようとする課題】従来の横型プローブカードは、上述したような優れた特徴や後述する特徴を有しているものの．プローブを横向きに配置しているために．従来の（第１または第２の）垂直型プローブカードよりも．プローブを高密度に設けるには不向きな構造で

プカードの場合．取り扱い中に、設けられている数百～数千本のプローブのうち．１本でも．ダメージが与えられて不具合が生じた場合．簡単に交換できない。つまり．プローブは．屈曲部が．上側支持基板と下側支持基板との間の隙間に位置するため、上下どちらにも引き抜くことができないという．修理上の困難さがある。

【００２０】なお、多数個の半導体集積回路の同時テストが可能な垂直型プローブカードは．多いもので数千本のプローブを有しているので．高価であるから当然修理が必要になる。このとき．プローブの取り替えが比較的容易な取り付け状態となっている従来の横型プローブカードと異なり．従来の第１の垂直型プローブカードの場合．一部の不良のプローブを１本ずつ容易に交換出来ないのが欠点となっている。

【００２１】かかる問題．即ち、一部の不良のプローブを１本ずつ容易に交換出来ない問題を解消したのが、前記従来の第２の垂直型プローブカードである。上述したように従来の第２の垂直型プローブカードのプローブは．全体が直線状である。よって、不具合を生じた一部のプローブは．その基端に接続されているジャンピングワイヤを外すのと前後して．プローブの基端側を固定している接着剤から外すと．上下いずれにも引き抜くことができ、新しいプローブも挿入できる。したがって、従来の第２の垂直型プローブカードの場合、プローブの１本ずつの交換は容易である。

【００２２】しかし、座屈部を有するプローブを備えた従来の第２の垂直型プローブカードにおいては．座屈部の弓なり状の撓みによる座屈は弾性限界に近い部分で行われ．余裕が少ないことが多い。そのため、プローブがときとして塑性変形を起こす可能性があり、１００万回程度の測定に耐えるためには信頼性にかける場合がある。

【００２３】また、従来の第１および第２の垂直型プローブカードの場合、プローブの先端が僅かに横滑りするスクラブ現象が発生しないため、テストを繰り返して実使用時間が長くなると、プローブの接触抵抗が増大するという問題がある。

【００２４】本発明の主たる目的は．高密度に設けられ．オーバードライブ時に余裕のある弾性変形をし、１本ずつの交換が容易なプローブと、これを用いたプローブカードを提供することにある。併せて、接触抵抗が増大するのを防ぐことが可能なプローブと、これを用いたプローブカードを提供することにある。

を有している。

【００２６】本発明の請求項２に係るプローブカードは、配線パターンが形成された基板と、前記配線パターンに電気的に接続されて基板から垂下されて配置される複数のプローブと、前記基板の下面側に設けられ、前記プローブを支持するプローブ支持部材とを備えており、前記プローブはプローブ支持部材より下側に突出する先端で、折り曲げ角度を９０度以上にして相互に逆に折り曲げ形成されている少なくとも２つの折曲部を有している。

【００２７】

【発明の実施の形態】以下、本発明のプローブを用いた本発明の実施の形態に係るプローブカードを図１および図２を参照しつつ説明する。なお、本発明の実施の形態に係るプローブカードは、前記図３に示した従来の垂直型プローブカードの代わりに、図３に示した固定台８００に固定されて使用されるものである。図１は本発明の実施の形態に係るプローブカードを示す概略的断面説明図、図２は本発明の実施の形態に係るプローブカードに用いられるプローブの先端側を示す概略的正面図である。

【００２８】本発明の実施の形態に係るプローブカードは、配線パターン（図示省略）が形成された基板３００と、前記配線パターンに電気的に接続されて基板３００から垂下されて配置される複数のプローブ１００と、前記基板３００の下面側に設けられ、前記プローブ１００を支持するプローブ支持部材２００とを備えており、前記プローブ１００はプローブ支持部材２００より下側に突出する先端で、折り曲げ角度を９０度以上にして相互に逆に折り曲げ形成されている２つの折曲部１４２Ａ、１４２Ｂを有している。

【００２９】前記プローブ１００は、直線状の垂直部１６０と、この垂直部１６０の先端側である接触部１４０に２つの折曲部１４２Ａ、１４２Ｂを有している。折曲部１４２Ａ、１４２Ｂは、折り曲げ角度を９０度以上、例えば１００度にして相互に逆に折り曲げ形成されている。折曲部１４２Ａ、１４２Ｂ間は横向き部分となり、オーバードライブ時にバネとしての機能を発揮する。折曲部１４２Ａよりも先端側は、電極パッド６１１に略垂直に接触するように略垂直になっている。

【００３０】プローブ１００は、例えば、次のようにして形成される。先ず、直径５０μｍのレニュウム３％を含有するタングステン線を電解研磨して、先端を尖らせ折曲部１４２Ｂとする。なお、図２ではプローブ１００の先端１４１は、その先端１４１の移動状況がわかりやすいように図示上尖らせているが、実際には、上述したように直径が例えば２５μｍに形成されている。

【００３１】プローブ支持部材２００は、例えば、基板３００の下面から垂下された棒状の支持部材２５０と、この支持部材２５０によって、基板３００と平行に支持された上側支持基板２１０及び下側支持基板２２０と、上側支持基板２１０の上面に塗布されてプローブ１００を固定するエポキシ系等の接着剤層２７０とで構成されている。

【００３２】上側支持基板２１０と下側支持基板２２０とには、ウエハ６００に形成された電極パッド６１１の配置に対応した複数個の貫通孔２１１、２２１がそれぞれ開設されている。この貫通孔２１１、２２１をプローブ１００が貫通することで位置決めされて支持されるとともに、隣接するプローブ１００同士の接触も未然に防止している。

【００３３】なお、上側支持基板２１０と下側支持基板２２０とは、例えば、厚さ０．２５ｍｍのマシナブルセラミックス（例えば三井鉱山株式会社の商品名マセライトなどが適している。）である。貫通孔２１１の大きさはプローブ１００の垂直部１６０を挿入可能なサイズである。即ち、貫通孔２１１の大きさは５０μｍより若干大きい程度でよい。また、貫通孔２２１の大きさは、例えば、プローブ１００の垂直部１６０のサイズ５０μｍよりやや大きい６０μｍである。

【００３４】基板３００には、前記貫通孔２１１、２２１と一直線状となる位置に、プローブ１００の基端を挿入可能なスルーホール３１１が形成されている。基板３００の上面には、プローブ１００の基端がジャンピングワイヤ７００を介して接続される電極３１０と、図示しないテストコンピュータが接続される端子３２０とが形成されている。基板３００には、図３に示した固定台８００に固定する締結部材（図示省略）用の貫通孔（図示省略）が設けられている。

【００３５】このように構成された本発明の実施の形態に係るプローブカードを組み立てる際には、例えば、プローブ１００の垂直部１６０を貫通孔２２１、２１１に挿入し、更に、スルーホール３１１に挿入する。プローブ１００の垂直部１６０の基端はジャンピングワイヤ７００に接続される。なお、例えば、上側支持基板２１０と下側支持基板２２０と間の距離は５ｍｍにして組み立

【００３７】このようにして組み立てられた本発明の実施の形態に係るプローブカードは、図３に示した固定台８００に図示しない締結部材によって固定されてウエハ６００のテストに使用される。可動テーブル７００にセットされたウエハ６００に形成された半導体集積回路６１０の電極パッド６１１が、オーバードライブ時に、プローブ１００の接触部１４０の先端１４１に対して垂線方向に押し上げられると、プローブ１００は、図２に示すようになる。即ち、プローブ１００の接触部１４０の先端１４１は、折曲部１４２Ｂを支点として、ほぼ弧を描くように上昇させられる。即ち、オーバードライブ時に、プローブ１００の接触部１４０の先端１４１にかかる垂線方向の力の一部が、水平方向の分力に変わり、プローブ１００の先端１４１は僅かに横滑りする。

【００３８】実際に測定してみると、プローブ１００の接触部１４０のバネ圧は平均で約１３ｇ、１００μｍのオーバードライブ時のスクラブ量（プローブ１００の先端１４１の水平移動量）は約５μｍであり、適切であった。なお、電極パッド６１１の大きさは例えば１００μｍ角程度である。

【００３９】このように本発明の実施の形態に係るプローブカードは、適切なスクラブ現象が発生するので、プローブ１００の接触部１４０の先端１４１が酸化や異物付着などで接触抵抗が増大するのを防ぐことができる。

【００４０】また、本発明の実施の形態に係るプローブカードの場合、不具合を生じたプローブ１００は、その基端に接続されているジャンピングワイヤ７００を外すのと前後して、プローブ１００の基端側を固定している接着剤層２７０から外すだけで、容易に下方に引き抜くことができる。また、新しいプローブ１００は、その基端側から、挿入することが容易である。なぜならば、プローブ１００の折曲部１４２Ａ、１４２Ｂが形成されている接触部１４０は、下側支持基板２２０よりも下側に配置されており、プローブ支持部材２００に支持されているプローブ１００の垂直部１６０が直線状に形成されているからである。なお、挿入されたプローブ１００は、再度その基端にジャンピングワイヤ７００が接続される一方、接着剤が塗布されて固定される。このように、不具合を生じた一部のプローブ１００の交換は、１本ずつでも容易である。

【００４１】また、本発明の実施の形態に係るプローブカードの場合、基板３００から垂下され、且つ電極パッド６１１に略垂直に接触するプローブ１００を有してい

プ１００の弾性限界の大きさは大きい状態とすることができる。

【００４３】なお、本発明の実施の形態に係るプローブカードにおいて、例えば、折曲部１４２Ａ、１４２Ｂ間の太さ寸法を変更することによって、プローブ１００の弾性限界の大きさ、前記バネ圧が調整可能である。また、折曲部１４２Ａ、１４２Ｂ間の長さ寸法を変更することによって、プローブ１００の前記弾性限界の大きさ、前記バネ圧、前記スクラブ量が調整可能である。

【００４４】更に、前記折り曲げ角度を変更することによって、前記スクラブ量が調整可能である。前記折り曲げ角度は、９０度以上が好ましいものの、９０度以下にすることも可能である。前記折り曲げ角度が９０度以下になると、プローブ１００の基端寄りの折曲部１４２Ｂが、先端１４１寄りの折曲部１４２Ａよりも常に低い位置に配置されることになる。よって、前記垂直部１６０寄りの折曲部１４２Ｂがオーバードライブ時にウエハ６００に接触することのないように設計上、注意が必要である。

【００４５】本発明の実施の形態に係るプローブカードの場合、折曲部は２つとしたが、もちろん、３つ以上の折曲部を形成してもよい。ただし、３つ以上の折曲部を形成するには、工数が増えるので、製造コスト的には２つの方が好ましい。

【００４６】また、１つの折曲部とすることも可能である。この場合、プローブの先端を電極パッドに略垂直に接触するようにするためには、折曲部は例えば湾曲させて形成するようになる。この場合、製造上、２つの折曲部のときよりは、手間であるので、製造コスト的には２つの方が好ましいのである。

【００４７】なお、プローブの先端を電極パッド６１１に略垂直に接触するようにするのは、スクラブ現象によって、プローブの先端が電極パッド６１１の表面側の摩擦等の影響を確実に受けるようにするためである。もし、プローブの先端が電極パッド６１１に浅い角度で接触する場合は、オーバードライブ時に、プローブの先端が電極パッド６１１の表面側の摩擦等の影響を殆ど受けないので、途中で止まることなく横滑りし、電極パッド６１１からはみ出てしまうおそれが高くなるからである。もちろん、電極パッド６１１からプローブの先端がはみ出てしまうとテスト結果は誤ったものとなってしまうので、このような状態にならないようにする必要がある。

い。

【００４９】ところで、本発明の実施の形態に係るプローブカードの場合、プローブ１００の垂直部１６０は直線状であるとし、特に径は同じにしているが、この垂直部１６０の一部であって、上側支持基板２１０と下側支持基板２２０との間の隙間に位置する部分を他よりも細く形成した座屈部としてもよい。これにより、オーバードライブ時にかかる力を折曲部以外に座屈部でも吸収させることができる。したがって、この場合、最も基端側に設けられた折曲部から先端にかけての部分のバネ圧を大きくしてもよくなり、先端側部が平面視で占める領域をより小さくできる。即ち、プローブをより密集して設けることが可能になる。

【００５０】

【発明の効果】以上説明したように、本発明の請求項１に係るプローブは、プローブカードを構成する基板から垂下されて配置され、測定対象物に形成された電極パッドに略垂直に接触するプローブであって、先端には折り曲げ角度を９０度以上にして相互に逆に折り曲げ形成されている少なくとも２つの折曲部を有している。

【００５１】よって、本発明の請求項１に係るプローブは、プローブカードに高密度に設けることができる。また、最も上側にある折曲部よりも先端側の部分であって、垂線方向の部分になっていない部分（傾向き部分とも呼ぶ。）は、垂線方向の部分よりも、オーバードライブ時の垂線方向の力を弾力性でもって緩和する弾性体としての機能を発揮する。前記傾向き部分は、他より特別細く形成する必要もないので、オーバードライブ時に余裕のある弾性変形をする部分となる。

【００５２】更に、基板から垂下されるプローブはプローブカードに設けられたとき、プローブの垂直部がプローブ支持部材によって支持されるのが普通である。つまり、折曲部を備えているプローブの先端側である接触部は、プローブ支持部材によって支持されない部分である。そして、前記プローブは、１本ずつの交換に支障をきたすおそれのある部分は、プローブの垂直部に特に備えているわけではない。そのため、基板から垂下される＊プローブは、一部のプローブに不具合が生じて交換したい場合に、プローブ支持部材から前記不具合が生じたプローブを１本ずつ下側に支障なく引き抜くことが可能である一方、新たなプローブはプローブ支持部材に対して、その下側からプローブの垂直部を支障なくセットすることが可能である。

【００５３】したがって、本発明の請求項１に係るプローブは、プローブカードに高密度に設けることができるプローブであって、メンテナンスコストを従来よりも低くできるものとなっている。

【００５４】一方、本発明の請求項２に係るプローブカードは、配線パターンが形成された基板と、前記配線パターンに電気的に接続されて基板から垂下されて配置される複数のプローブと、前記基板の下面側に設けられ、前記プローブを支持するプローブ支持部材とを備えており、前記プローブはプローブ支持部材より下側に突出する先端で、折り曲げ角度を９０度以上にして相互に逆に折り曲げ形成されている少なくとも２つの折曲部を有している。

【００５５】このプローブカードは、前記請求項１に係るプローブを用いたものであるので、上述と同様の効果を得ることができる。

【図面の簡単な説明】

【図１】本発明の実施の形態に係るプローブカードを示す概略的断面説明図である。

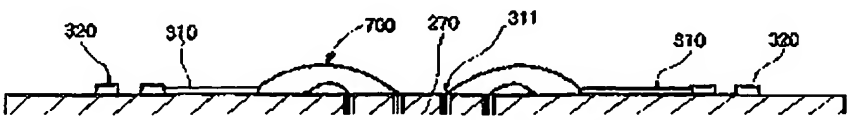
【図２】本発明の実施の形態に係るプローブカードに用いられるプローブの先端側を示す概略的正面図である。

【図３】従来の垂直型プローブカードとその周辺機構とを示す概略的断面説明図である。

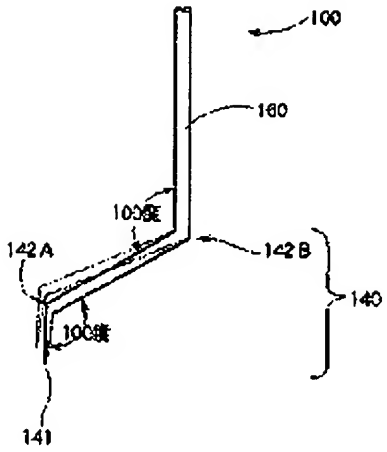
【符号の説明】

１００　プローブ
１４０　接触部
１４２Ａ　折曲部
１４２Ｂ　折曲部
１６０　垂直部
２００　プローブ支持部材
３００　基板

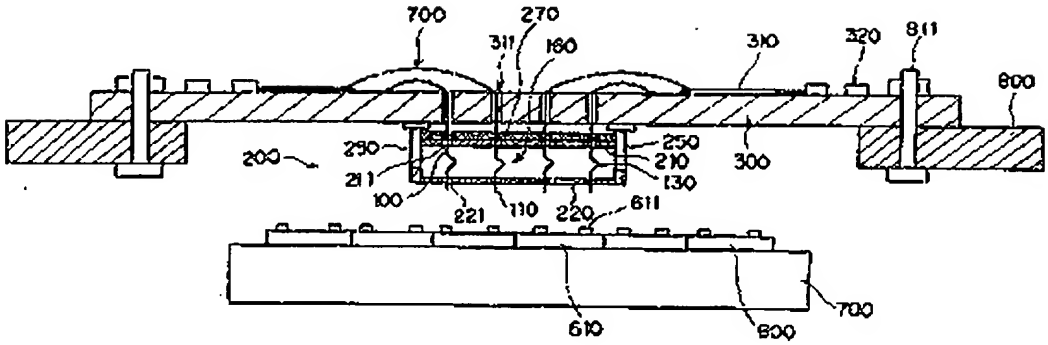
【図１】



【図2】



【図3】



フロントページの続き

(72)発明者　岩田　浩
兵庫県尼崎市西長洲町2丁目5番13号　日本電子材料株式会社内

Fターム(参考)　2G011 AA02 AA16 AB01 AB06 AB07 AC05 AC14 AE03
4M106 AA02 BA01 BA14 DD03 DD04 DD06 DD10